Project Abstract

Collaborative Research: Place-Based Decision Support for Spatial and Temporal Transference of Risk and Hazards

CMS0433158 and CMS0433376
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Vulnerability science is an emergent multidisciplinary field focused on what makes people and places vulnerable to environmental threats from natural, technological, or human-induced hazards. Our current knowledge base is fragmented and insufficient to advance understanding of many key social, environmental, and methodological issues in vulnerability science. This project examines one of the least understood aspects of hazard vulnerability—the role of inequality. Specifically, the research proposes to develop new methods and spatial models for measuring the differential susceptibility and impacts of risks and hazards on people and places and how this in turn affects the resilience of these places to extreme events and chronic risks.

Overall Objective

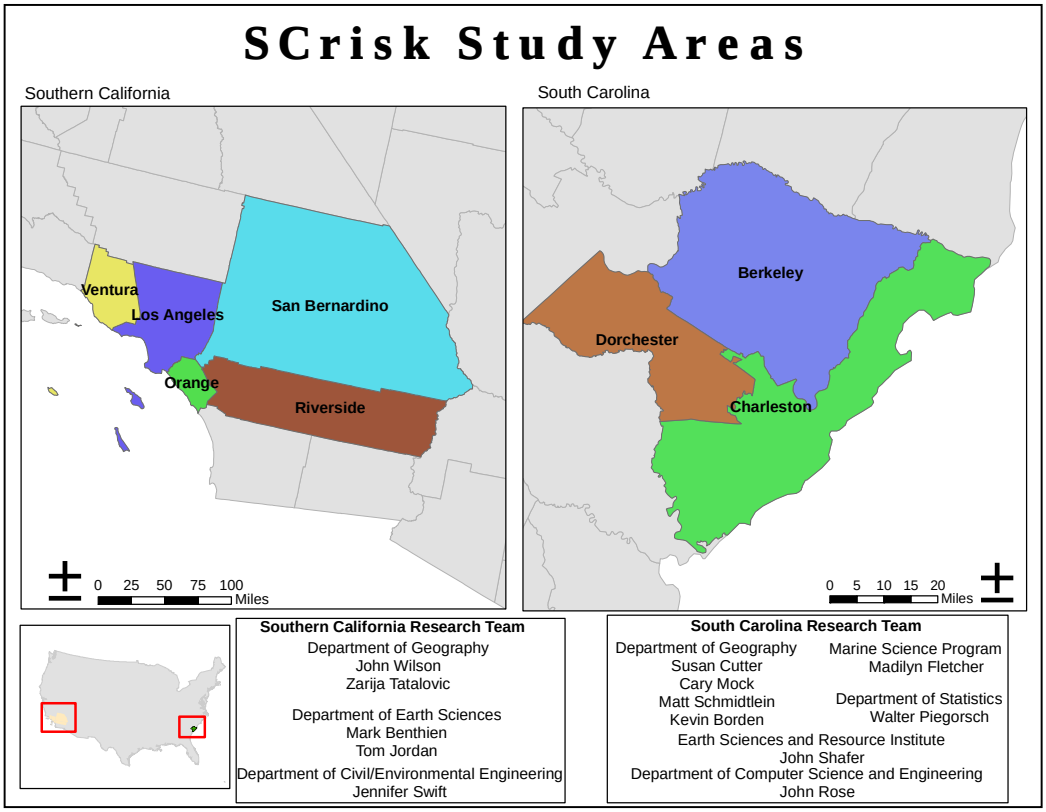
The project examines three basic research questions: (1) What is the role of current practice and public policy in facilitating the relocation of risk either spatially or temporally? This question examines the argument that risk may be increased or simply moved from one place to another by various types of interventions or other societal trends. (2) How does spatial bias amplify or attenuate risks and hazards and at what scale are these most evident? This question recognizes the special characteristic of particular places and the larger number of inter-related factors that influence risk. (3) Can we anticipate inequities in the distribution of vulnerabilities and how can this be lessened through improved decision-making with respect to hazards mitigation and response?

Two place-based case studies will serve as test-beds for linking the theory, concepts, methods and models in a decision support system—the greater Los Angeles area and the Charleston, South Carolina metropolitan region (Figure 1). These test-beds were chosen based on the mix of common and unique hazards in each, a range in scale-dependent complexities based on physiography, size, wealth, demographics, the nature of the built environment and the prior experience and local place-based knowledge of team members. The research team is working on developing place-based integrated hazards assessment models, starting initially with two "design events" (seismic in Southern California; hurricane in South Carolina).

When completed, this project will advance hazards and disasters research and decision-making through improved data, methods, models and analytical techniques. It provides a protocol for gathering information to guide and advance knowledge of the changing distribution and nature of

hazards vulnerability, in addition to a scalable metric that could be employed in decisions regarding preparedness, planning, and response.

Figure 1



Progress and Broader Impacts

The challenge for multi-disciplinary, multi-institutional projects is one of communication and continuity. To facilitate the research the Lead Investigators have met with both research teams in face-to-face meetings during the year. A project intranet (wiki) has been set up for both research groups as a means for record keeping, protocol sharing, and updating on the progress of the research. The demographic change protocol is nearing completion with the creation of a social vulnerability index for Charleston at the census tract level (downscaled from the county level) for the decadal periods 1960-2000. A similar index is under construction for the Los Angeles region. A companion built environment index for Charleston is nearing completion as well for the same 1960-2000 period. Work continues on the development of the hurricane and seismic design events. Historical building code policies are being developed for the Los Angeles region for this time range, which will be used to modify the existing building inventory for specific code adoption periods. Building code policies refer to the code adoption, which determines the

design level, and construction quality. Sensitivity analyses will initially be conducted using HAZUS to examine the role of various hazard and structural parameters in vulnerability and loss estimations.

A presentation on the project was made to the National Science Foundation at the Human and Social Dynamics FY 2005 Roll-Out Meeting on December 9, 2004. A poster presentation at the Natural Hazards annual workshop in Boulder, CO (July 2005) highlighted the project as well. The Natural Hazards Workshop provides a venue for academic researchers to interact with the emergency management practitioner community in the application of new knowledge and understanding in the social, natural, and engineering sciences to support the emergency management and disasters practitioners.

Three graduate students and one undergraduate student were supported on the project (South Carolina) for the first project year from four different academic departments--Geography, Statistics, Marine Sciences, and Civil Engineering. One graduate student, one education-outreach program manager (SCEC), and one research faculty (Co-PI) from the departments of Geography, Earth Sciences and Civil Engineering, respectively (California), were also supported for the first year of the project.